Memorandum

To: File, Internal, Group
From: Patrick Ducey
Date: 12/22/2021

RE: AltEn, LLC Proposed Outfall Discharge Limits
NDEE ID: 84069
Program ID: PCS TBD

Water Quality-Based Model Results for Two Proposed Discharge Locations

The content and results of this memorandum are not final. They are subject to change based on new information or the receipt of a NPDES permit application. The proposed requirements in this memorandum were developed using NDEE regulations and guidance and EPA risk-based aquatic life benchmarks for registered pesticides.

The Department investigated the possibility of discharge of treated wastewater from the AltEn facility in response to a request by the AltEn Facility Response Group (AFRG) dated November 17, 2021. There are two proposed discharge locations addressed by this memorandum. The first proposed location would include a discharge directly from the AltEn site, likely after treatment or from a lagoon or tank. For the purposes of this memorandum, this proposed location shall be designated Outfall 003. Outfall 003 is proposed to discharge to an undesignated tributary to Clear Creek. The second proposed location is to pipe the treated wastewater a few miles to a location downstream of Johnson Creek Reservoir 22-A. For the purposes of this memorandum, it will be designated proposed Outfall 004. Outfall 004 is proposed to discharge into Johnson Creek downstream of the reservoir.

The Department used NPDES limit modeling techniques to develop limits for ammonia and pesticides in the form of wasteload allocations. Ammonia is a pollutant present in the treated wastewater and has the potential to negatively impact receiving waterbodies. The Department also modeled potential pesticide limits for multiple parameters that may negatively impact waters of the State.

Ammonia limits in Nebraska are developed to be protective of aquatic life. There are two types of criteria: chronic (30-day) and acute (1-day). The criteria are based on levels that might, if exceeded, negatively harm aquatic life, either acutely causing mortality over a short period (1-day) or negative long-term harm based on impairment through morbidity or reduction in reproduction (30-day). The criteria are based on two numbers: pH and temperature. The chronic criteria are based on the median pH and median temperature of the receiving stream, and the acute criteria are based on the 90^{th} percentile of the effluent pH and temperature. Ammonia limits are anticipated to be present in any permit to be protective of the receiving stream as testing indicates amounts from 350-524 mg/L in the treated AltEn wastewater.

The Department is also concerned about the amount of nutrients present in the treated wastewater. While most nitrogen is present in the form of ammonia, if the water is treated to remove ammonia, it may be chemically changed into nitrate. There are Title 117 and Title 118 limits for nitrate. One Title 117 limit is based on the public drinking water standard of 10 mg/L for nitrate (also the Title 118 groundwater limit), while the other is 100 mg/L for agricultural use. Limits are anticipated to be present in a permit depending on the designated uses assigned to the receiving stream. It could be based on the stream designation, usage, and interaction with groundwater or wells. One discharge location may have the agricultural limit of 100 mg/L while another outfall location will have a limit based on the drinking water standard of 10 mg/L for nitrate and a 0.7 mg/L limit for Glyphosate.

The Department consulted the groundwater section to review the proposed discharge locations. The groundwater review stated that the discharge at proposed Outfall 003 would be subject to the groundwater standards of NDEE Title 118. This would impose a limit of 10 mg/L for nitrate. The other location, Outfall 004, would not be subject to Title 118 standards if the creek was determined to be perennial and always have flowing water. At this

time, more information may be required to determine if this discharge from Outfall 004 should have NDEE Title 118 limits for nitrate, or if the agricultural limit of 100 mg/L should apply. If drinking water limits apply to Outfall 004 for nitrate, then the public drinking water standard for Glyphosate will apply as well.

The AltEn treated wastewater may contain pesticides. The proposed suite of pesticides to be monitored and/or be limited was chosen based on the pollutants in Table 1 of the AltEn proposed land application plan (Abamectin, Azoxystrobin, Chlorantraniliprole, Clothianidin, Fluoxastrobin, Imidacloprid, Glyphosate, Mefenoxam, Prothioconazole, Sedaxane, Tebuconazole, Thiabendazole, and Thiamethoxam). The most recent version of the plan was submitted to the Department on December 14, 2021 and is available in the public record (NDEE Document ID 20210877921). In addition to the pollutants, any pesticide that was above the detection level in treated wastewater was added to monitored/limited effluent parameters (Fludioxonil and Propiconazole). Laboratory reports with treated wastewater testing results have been submitted for many sampling events such as those that took place on May 24, 2021, June 21, 2021, July 6, 2021, and August 5, 2021.

For most pesticides that have been found at AltEn, there are no NDEE Title 117 water quality criteria. Therefore, the Department used EPA ecological benchmarks (see attachments to this memorandum). The Department based proposed limits on the most stringent EPA benchmark. This could be either the chronic or acute vertebrate or invertebrate benchmark or the most stringent acute plant life benchmark. All proposed limits are based on the ecological benchmarks. The benchmarks are based on toxicity values from scientific studies that EPA reviewed and used to estimate risk to freshwater organisms from exposure to pesticides and their degradates in their most recent publicly available ecological risk assessments.

The only pesticide exception to this is Glyphosate, which has lower NDEE Title 117 drinking water criteria of 700 µg/L. If it is determined that the drinking water standard applies, then the limit will be based on this criteria. For some pollutants, the vertebrate benchmark was more stringent, for other pollutants, the invertebrate benchmarks, and for others the acute plant benchmark was lowest. In any case, the pesticide limits will be crafted to protect water quality and human health.

When no NDEE Title 117 pesticide criteria are available, the Department has determined that EPA benchmarks are protective of water quality of the receiving stream. As set forth in NDEE Title 119, Chapter 3, no permit may be issued to a new source if its construction or operation will cause or contribute to the violation of water quality standards. All permits must be written to be protective of water quality, and all permits are written with an antidegradation clause as set forth in 40 CFR Part 131.12. The limitations in the draft permit are protective of the Clean Water Act Section 101(a)(2) fishable/swimmable goals and ensure the existing quality of water in the receiving stream is not lowered.

According to NDEE Title 117, Chapter 1 071, water quality means the biological, chemical, physical, and radiological integrity of a body of water. Discharges must be protective of the biological integrity of the water body, which means the plant, animal, and bacteriological species of the receiving stream. Therefore, the most protective ecological benchmark was used to calculate proposed permit limits for each outfall.

Outfall 003 is proposed to discharge to an undesignated tributary of Clear Creek (LP2-10120). This receiving stream is an intermittent stream or ditch, though it still is defined as waters of the State as set forth in NDEE Title 119, Chapter 1 122. The outfall would flow within a few hundred feet of a public supply well and might have the possibility to interact with groundwater as there is no full-time flow in the intermittent stream. Therefore, the NDEE 117 public drinking water standard of 10 mg/L for nitrate would be implemented for Outfall 003. The NDEE groundwater section review came to this conclusion. In addition, the public drinking water criteria for Glyphosate, which is the most stringent benchmark, will be used to calculate limits. Other limits will be based on EPA ecological benchmarks.

For the proposed Outfall 004 discharge to Johnson Creek downstream of Johnson Creek Reservoir 22-A (segment LP2-10121), the outfall would discharge to a stream that is designated as perennial according to USGS topographic maps (see attached maps). The Department anticipates year-round flow in this stream, though more data may be needed. Flow in Johnson Creek may be regulated by the presence of the dam on the reservoir, but

overflow/seepage/groundwater flow is anticipated. Based on Department permitting procedures and the NDEE Continuing Planning Process, only surface water standards are to be implemented for the discharge to Johnson Creek. The NDEE Title 117, Chapter 4 water quality criteria and EPA benchmarks are protective of water quality. If Johnson Creek is determined to have sufficient flow, the agricultural criteria of 100 mg/L for nitrate will be implemented for the discharge to Johnson Creek. More data may be needed prior to any permit issuance.

The Department creates water quality-based limits using wasteload allocations (WLAs) following Continuing Planning Process methods, NDEE Title 117 requirements, and EPA methodologies set forth in the *Technical Support Document for Water Quality-based Toxics Control (TSD)*. These WLAs are designed to be protective of the receiving stream. The WLAs utilize mixing zones and mass-balance equations based on water quality criteria and/or benchmarks to create permit limits.

For proposed Outfall 003, the receiving stream conditions are based on the requirements set forth in NDEE Title 117, Chapter 2. According to NDEE Title 117, wastewater may be discharged to intermittent streams or streams with low to no flow (warmwater B criteria requirements are applied). According to the title, there is a regulatory minimum low flow rate. This is 0.1 cubic feet per second (cfs) for the acute and 1.0 cfs for the chronic wasteload allocation. The stream also has maximum mixing zone percentages applied (50% for the acute and 100% for the chronic). For acute criteria and benchmarks, the wasteload allocations will be based on a receiving stream flow of 0.1 cfs and 50% mixing. For chronic-based limits, the receiving stream will have a flow of 1.0 cfs and 100% mixing.

According to the USGS topographic map Johnson Creek has perennial flow, and therefore the flow must be based on stream gage or Department data. There is not any stream gage upstream or downstream of the proposed discharge location. The Department sampled Johnson Creek from May through September in 2016. The site was sampled weekly, including flow. The results of the flow are attached to this memorandum. The day that flow rating curve was created was measured at 0.66 cfs. Flow ranged from 0.66 to 2.4 cfs, with an average of 1.22 cfs. Based on this data, the Department used 0.66 cfs as the receiving stream flow for acute-based wasteload allocations and the average of 1.22 cfs for the chronic-based calculations.

For variable flow receiving stream wasteload allocations (WLAs) such as Johnson Creek, other data is needed. The Department chose the average flow of 1.22 cfs as the known stream flow. Velocity was obtained from Department data sheets and is included in the memorandum. A velocity of 0.58 feet per second was chosen to be used in wasteload allocations as it was in the center of the stream. For width, on the day the rating curve was produced, the stream was measured to be 6 feet wide, so this value was used in all WLAs. When the flow was divided by the velocity and width, an average depth of 0.35 feet was obtained and used in the WLA. If more receiving stream flow data is obtained it may be used in subsequent WLAs. As limits are calculated using low flow data, any other stream data should be obtained in periods of low flow.

Stream slope was based on topographic maps and was a foot per mile higher than the value measured by NDEE. The value of 3 feet per mile was chosen as the discharge point was upstream of the Department field site. The point upstream is anticipated to be steeper based on the topographic map. Sinuosity was calculated by dividing the distance the stream traveled compared to a straight line. This was mapped out in Google Earth and resulted in a sinuosity of 1.13 (see attachments).

For both proposed Outfalls 003 and 004, the discharge would be to a warmwater B stream (or equivalent of a warmwater B). As set forth in NDEE Title 117, the acute mixing zone is 125 feet long. For the chronic mixing zone length in the WLA is 2,500 feet long.

According to Department permitting procedures and the Continuing Planning Process document, the chronic ammonia criteria is based on the receiving stream conditions. Therefore, the median of monthly average temperature and pH from 2015-2018 were used to calculate the chronic ammonia criteria. For the acute criteria, effluent data is used as the stream is anticipated to be effluent-dominated. A large amount of temperature data is not available, so the 90th percentile of Wahoo Creek was used for the acute criteria. The Wahoo Creek sampling point was used as it was the nearest sampling site with monthly data. For pH, effluent data was used. However,

only a few sample results for pH from treated effluent were used. The pH was measured to be from 6.7 to 7.0 standard units. It is possible that further treatment may change the pH. To be conservative and protective of the receiving stream, a pH of 7.5 was used in the acute criteria calculation. This may change based on new effluent information.

For a coefficient of variation, needed in all WLAs, the Department did not have enough data to calculate a WLA according to *TSD* requirements. Therefore, the default value of 0.6 was chosen as it represented a reasonable degree of effluent variability as set forth in the *TSD*.

Background ammonia may impact the amount of ammonia a facility can discharge as the amount present in the stream is already allocated. Excess ammonia from the effluent cannot negatively impact the receiving stream, so the background levels must be taken into account when limits are calculated. Background ammonia levels for each stream location was based on data from Wahoo Creek (LP2-10100), the nearest sample location with monthly sample results. For chronic WLAs, the median of monthly average data was used, while for the acute WLAs the 90th percentile of monthly averages was used. This location does not have any pesticide sampling data, so the background pesticide levels were set at zero for both acute and chronic WLAs. If background pesticide levels are determined, the WLAs may need to be updated.

In addition to water quality criteria and benchmarks, the Department may use other data to create WLAs. Effluent flow is needed. For this memorandum, the Department modeled four flow rates for each discharge. These are 0.1, 0.5, 1.0, and 1.5 million gallons per day (MGD). Four tables of proposed limits are provided for each discharge location.

The results of the water quality-based calculations are included below. The results are organized by discharge location and proposed effluent flow. Based on the results, the lack of receiving stream flow means that most proposed ammonia and pesticide limits are criteria-based. Increasing effluent flow may only result in a slight reduction of limits as the discharge would need to be at or near criteria level to be able to meet water quality.

The Department looked at data for wastewater that had been treated for pesticides. Based on the results, ammonia must be treated to meet the proposed permit limits. For Outfall 003, nitrates must be removed to meet the 10 mg/L standard and for 004 it must meet the agricultural standard of 100 mg/L. Based on the sampling results for pesticides, at current levels, the proposed discharges have the potential to exceed water quality for Abamectin, Chlorantraniliprole, Clothianidin, Ipconazole, Prothioconazole, Tebuconazole, and Thiamethoxam. In order to discharge and meet water quality, the wastewater would need to be further treated for pesticides.

The possibility exists that the amount of pesticides or conventional pollutants may combine to make the effluent degrade water quality, or there could be an unknown pollutant. The effluent must not negatively impact water quality or degrade the designated uses of the stream. Therefore, the Department will be implementing whole effluent toxicity limits. The limit is established via a wasteload allocation using the ammonia mixing zones calculated for each outfall and flow rate. Based on the results of the WLAs, the limit for each discharge location and flow rate is the same. A limit of 1.0 acute toxicity units is set forth for both Outfalls 003 and 004.

There are other pollutants of concern. The biochemical oxygen demand (BOD) levels of the treated effluent are high, with values reported as high as 3000 mg/L. There is concern that this amount of BOD will cause impairment to the dissolved oxygen levels in the stream. Two types of limits may be considered: technology-based limits or water quality-based limits. Technology-based limits may be implemented using the requirements in 40 CFR, the best professional judgment process, or by implementing NDEE Title 119, Chapter 21 secondary standards.

As a former ethanol producing facility (SIC code 2869), the treated wastewater is process wastewater. The wastewater, while currently treated for pesticides, was a byproduct of the ethanol making process. If stormwater, it may have been in contact with pesticides and other byproducts. This process wastewater is subject to the requirements set forth in 40 CFR Part 414. The applicability section set forth in 40 CFR Part 414.60 stated that process wastewater resulting from the manufacture of ethanol is regulated by the section. Therefore, the

wastewater discharged from the site can have limits for conventional pollutants BOD and total suspended solids (TSS). Based on the date of the regulations and age of the AltEn facility, the wastewater is subject to the new source performance standards set forth in 40 CFR Part 414.64. BOD shall have a limit of 30 mg/L for a monthly average and 80 mg/L for a daily maximum. TSS shall have a limit of 46 mg/L for a monthly average and 149 mg/L for a daily maximum.

If the BOD limits are based on water quality, for Johnson Creek a Streeter-Phelps calculation may be used to calculate a dissolved oxygen sag. The equation can be used to find the maximum amount of BOD that can be discharged and to not cause the stream to go below Title 117, Chapter 4 warmwater dissolved oxygen standards. More information may be required to determine if the wastewater discharged to the receiving stream shall have water quality-based limits for BOD.

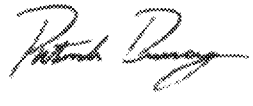
The amounts of total suspended solids, total organic carbon, and total phosphorus may cause impairment to the receiving stream. Total suspended solids levels in the treated wastewater have been from 52.3-387 mg/L, though they also have been as low as less than 9.8 mg/L. Total organic carbon has been from 855-2710 mg/L. Phosphorus has been from 29.3 to 140 mg/L in the treated wastewater. If solids are removed, the amount of phosphorus is anticipated to go down. However, this is dependent on the treatment technology. Based on new information, potential monitoring and limits may be determined in future limit drafting. As stated above, TSS can have technology-based limits set forth from 40 CFR Part 414.64.

The pH limits for the discharge are water quality-based limits set forth in NDEE Title 117, Chapter 4. The pH shall be maintained between 6.5 and 9.0 standard units (S.U.).

The Department has determined that the proposed discharge from Outfall 003 is infeasible. The concerns are NDEE Title 117 public drinking water and NDEE Title 118 groundwater limits, the downstream impoundment on the undesignated tributary to Clear Creek, and the possibility that the anticipated effluent flow would overwhelm the receiving stream (undesignated tributary). In addition, the proposed Outfall 003 receiving stream received contaminated stormwater, and without testing or remediation, the amount of pesticides present in the tributary is unknown. Therefore, the Department will not permit a discharge of treated process wastewater directly from the AltEn, LLC location (proposed Outfall 003).

Further treatment may be required if the proposed permit is to discharge to Outfall 004. These limits for the site are constrained by the amount of receiving stream flow, potential to impact groundwater, and the water quality-criteria and benchmarks. These proposed limits are calculated to be protective of the receiving streams.

Johnson Creek and the downstream Clear Creek are anticipated to flow over the City of Lincoln Wellhead Protection Area (WHPA). If the receiving stream has a large flow rate there is less potential to negatively impact groundwater quality. Clear Creek (LP2-10130) is a coldwater stream. It is possible that it will provide more flow to downstream segments. Based on increased flow it is less likely that a discharge into Clear Creek would interact with groundwater. However, whether groundwater limits for pollutants such as nitrate should be implemented for Outfall 004 is still up for debate and can change based on new information. At this time, if there is appreciable flow, the agricultural limit of 100 mg/L for nitrate is anticipated to be implemented.



Outfall 003 Discharge to Undesignated Tributary to Clear Creek – 0.1 MGD Effluent Flow

AltEn, LLC – Projected Limitations for Outfall 003 – 0.1 MGD		
Parameter	**Monthly Average**	**Daily Maximum**
Spring Ammonia (March 1 – May 31)	7.43 mg/L	14.90 mg/L
Summer Ammonia (June 1 – October 31)	4.07 mg/L	8.16 mg/L
Winter Ammonia (Nov. 1 – February 28 [29])	11.38 mg/L	22.84 mg/L
Abamectin	0.112 µg/L	0.225 µg/L
Azoxystrobin[1]	32.32 µg/L	68.84 µg/L
Chlorantraniliprole	5.474 µg/L	10.982 µg/L
Clothianidin	0.452 µg/L	0.907 µg/L
Fludioxonil	126.57 µg/L	253.92 µg/L
Fluoxastrobin	39.572 µg/L	79.390 µg/L
Glyphosate[2]	6328.5 µg/L or 6.3285 mg/L	12696.2 µg/L or 12.6962 mg/L
Imidacloprid	0.0904 µg/L	0.1814 µg/L
Ipconazole	1.627 µg/L	3.265 µg/L
Mefenoxam	10849 µg/L or 10.849 mg/L	21765 µg/L or 21.765 mg/L
Propiconazole[1]	13.850 µg/L	27.786 µg/L
Prothioconazole[1]	3.496 µg/L	7.013 µg/L
Sedaxane	Report	Report
Tebuconazole	99.45 µg/L	199.51 µg/L
Thiabendazole	102.23 µg/L	205.09 µg/L
Thiamethoxam	6.690 µg/L	13.422 µg/L
Nitrate as Nitrogen	Report	10 mg/L
BOD	30 mg/L	80 mg/L
TSS	46 mg/L	149 mg/L
pH	6.5 – 9.0 S.U.	
Whole Effluent Toxicity – *Ceriodaphnia sp*	Report	1.0 TUa
Whole Effluent Toxicity – *Pimephales Promelas*	Report	1.0 TUa

[1]Calculated using the most stringent acute-based plant benchmark
[2]Calculated using the most stringent human health benchmark

Outfall 003 Discharge to Undesignated Tributary to Clear Creek – 0.5 MGD Effluent Flow

AltEn, LLC – Projected Limitations for Outfall 003 – 0.5 MGD		
Parameter	**Monthly Average**	**Daily Maximum**
Spring Ammonia (March 1 – May 31)	3.55 mg/L	7.12 mg/L
Summer Ammonia (June 1 – October 31)	1.86 mg/L	3.74 mg/L
Winter Ammonia (Nov. 1 – February 28 [29])	3.56 mg/L	7.14 mg/L
Abamectin	0.090 µg/L	0.181 µg/L
Azoxystrobin[1]	26.00 µg/L	52.17 µg/L
Chlorantraniliprole	4.405 µg/L	8.836 µg/L
Clothianidin	0.139 µg/L	0.279 µg/L
Fludioxonil	38.881 µg/L	78.003 µg/L
Fluoxastrobin	31.840 µg/L	63.878 µg/L
Glyphosate[2]	1944.1 µg/L or 1.9441 mg/L	3900.1 µg/L or 3.9001 mg/L
Imidacloprid	0.0278 µg/L	0.0557 µg/L
Ipconazole	0.500 µg/L	1.003 µg/L
Mefenoxam	3332.7 µg/L or 3.3327 mg/L	6686.0 µg/L or 6.686 mg/L
Propiconazole[1]	11.144 µg/L	22.357 µg/L
Prothioconazole[1]	2.813 µg/L	5.643 µg/L
Sedaxane	Report	Report
Tebuconazole	30.55 µg/L	61.29 µg/L
Thiabendazole	82.25 µg/L	165.02 µg/L
Thiamethoxam	2.055 µg/L	4.123 µg/L
Nitrate as Nitrogen	Report	10 mg/L
BOD	30 mg/L	80 mg/L
TSS	46 mg/L	149 mg/L
pH	6.5 – 9.0 S.U.	
Whole Effluent Toxicity – *Ceriodaphnia sp*	Report	1.0 TUa
Whole Effluent Toxicity – *Pimephales Promelas*	Report	1.0 TUa

[1]Calculated using the most stringent acute-based plant benchmark
[2]Calculated using the most stringent human health benchmark

Outfall 003 Discharge to Undesignated Tributary to Clear Creek – 1.0 MGD Effluent Flow

AltEn, LLC – Projected Limitations for Outfall 003 – 1.0 MGD		
Parameter	**Monthly Average**	**Daily Maximum**
Spring Ammonia (March 1 – May 31)	2.58 mg/L	5.19 mg/L
Summer Ammonia (June 1 – October 31)	1.36 mg/L	2.73 mg/L
Winter Ammonia (Nov. 1 – February 28 [29])	2.58 mg/L	5.18 mg/L
Abamectin	0.087 µg/L	0.175 µg/L
Azoxystrobin[1]	25.24 µg/L	50.58 µg/L
Chlorantraniliprole	4.271 µg/L	8.568 µg/L
Clothianidin	0.0997 µg/L	0.2000 µg/L
Fludioxonil	27.920 µg/L	56.013 µg/L
Fluoxastrobin	30.874 µg/L	61.939 µg/L
Glyphosate[2]	1396.0 µg/L or 1.396 mg/L	2800.6 µg/L or 2.8006 mg/L
Imidacloprid	0.0199 µg/L	0.0400 µg/L
Ipconazole	0.359 µg/L	0.720 µg/L
Mefenoxam	2393.15 µg/L or 2.3932 mg/L	4801.11 µg/L or 4.8011 mg/L
Propiconazole[1]	10.806 µg/L	21.679 µg/L
Prothioconazole[1]	2.727 µg/L	5.471 µg/L
Sedaxane	Report	Report
Tebuconazole	21.94 µg/L	44.01 µg/L
Thiabendazole	79.76 µg/L	160.01 µg/L
Thiamethoxam	1.476 µg/L	2.961 µg/L
Nitrate as Nitrogen	Report	10 mg/L
BOD	30 mg/L	80 mg/L
TSS	46 mg/L	149 mg/L
pH	6.5 – 9.0 S.U.	
Whole Effluent Toxicity – *Ceriodaphnia sp*	Report	1.0 TUa
Whole Effluent Toxicity – *Pimephales Prometas*	Report	1.0 TUa

[1]Calculated using the most stringent acute-based plant benchmark
[2]Calculated using the most stringent human health benchmark

Outfall 003 Discharge to Undesignated Tributary to Clear Creek – 1.5 MGD Effluent Flow

AltEn, LLC – Projected Limitations for Outfall 003 – 1.5 MGD		
Parameter	**Monthly Average**	**Daily Maximum**
Spring Ammonia (March 1 – May 31)	2.26 mg/L	4.54 mg/L
Summer Ammonia (June 1 – October 31)	1.19 mg/L	2.39 mg/L
Winter Ammonia (Nov. 1 – February 28 [29])	2.26 mg/L	4.53 mg/L
Abamectin	0.087 µg/L	0.174 µg/L
Azoxystrobin[1]	24.95 µg/L	50.06 µg/L
Chlorantraniliprole	4.226 µg/L	8.479 µg/L
Clothianidin	0.0867 µg/L	0.1739 µg/L
Fludioxonil	24.266 µg/L	48.683 µg/L
Fluoxastrobin	30.552 µg/L	61.293 µg/L
Glyphosate[2]	1213.3 µg/L or 1.2133 mg/L	2434.1 µg/L or 2.4341 mg/L
Imidacloprid	0.0173 µg/L	0.0348 µg/L
Ipconazole	0.312 µg/L	0.626 µg/L
Mefenoxam	2079.98 µg/L or 2.080 mg/L	4172.83 µg/L or 4.1728 mg/L
Propiconazole[1]	10.693 µg/L	21.452 µg/L
Prothioconazole[1]	2.699 µg/L	5.414 µg/L
Sedaxane	Report	Report
Tebuconazole	19.07 µg/L	38.25 µg/L
Thiabendazole	72.80 µg/L	146.05 µg/L
Thiamethoxam	1.283 µg/L	2.573 µg/L
Nitrate as Nitrogen	Report	10 mg/L
BOD	30 mg/L	80 mg/L
TSS	46 mg/L	149 mg/L
pH	6.5 – 9.0 S.U.	
Whole Effluent Toxicity – *Ceriodaphnia sp*	Report	1.0 TUa
Whole Effluent Toxicity – *Pimephales Promelas*	Report	1.0 TUa

[1]Calculated using the most stringent acute-based plant benchmark
[2]Calculated using the most stringent human health benchmark

Outfall 004 Discharge to Johnson Creek downstream of Reservoir 22-A – 0.1 MGD Effluent Flow

AltEn, LLC – Projected Limitations for Johnson Creek – 0.1 MGD		
Parameter	**Monthly Average**	**Daily Maximum**
Spring Ammonia (March 1 – May 31)	11.57 mg/L	23.20 mg/L
Summer Ammonia (June 1 – October 31)	6.48 mg/L	12.99 mg/L
Winter Ammonia (Nov. 1 – February 28 [29])	13.53 mg/L	27.15 mg/L
Abamectin	0.181 µg/L	0.364 µg/L
Azoxystrobin[1]	52.308 µg/L	104.940 µg/L
Chlorantraniliprole	8.860 µg/L	17.776 µg/L
Clothianidin	0.538 µg/L	1.080 µg/L
Fludioxonil	150.68 µg/L	302.30 µg/L
Fluoxastrobin	64.051 µg/L	128.498 µg/L
Glyphosate[1]	12703 µg/L or 12.703 mg/L	25486 µg/L or 24.486 mg/L
Imidacloprid	0.108 µg/L	0.216 µg/L
Ipconazole	1.937 µg/L	3.887 µg/L
Mefenoxam	12916 µg/L or 12.916 mg/L	25912 µg/L or 25.912 mg/L
Propiconazole[1]	22.418 µg/L	44.974 µg/L
Prothioconazole[1]	5.658 µg/L	11.351 µg/L
Sedaxane	Report	Report
Tebuconazole	118.40 µg/L	237.52 µg/L
Thiabendazole	165.47 µg/L	331.95 µg/L
Thiamethoxam	7.965 µg/L	15.979 µg/L
Nitrate as Nitrogen	Report	100 mg/L
BOD	30 mg/L	80 mg/L
TSS	46 mg/L	149 mg/L
pH	6.5 – 9.0 S.U.	
Whole Effluent Toxicity – *Ceriodaphnia sp*	Report	1.0 TUa
Whole Effluent Toxicity – *Pimephales Promelas*	Report	1.0 TUa

[1]Calculated using the most stringent acute-based plant benchmark

Outfall 004 Discharge to Johnson Creek downstream of Reservoir 22-A – 0.5 MGD Effluent Flow

AltEn, LLC – Projected Limitations for Johnson Creek – 0.5 MGD		
Parameter	**Monthly Average**	**Daily Maximum**
Spring Ammonia (March 1 – May 31)	3.98 mg/L	7.98 mg/L
Summer Ammonia (June 1 – October 31)	2.09 mg/L	4.19 mg/L
Winter Ammonia (Nov. 1 – February 28 [29])	3.99 mg/L	8.00 mg/L
Abamectin	0.091 µg/L	0.183 µg/L
Azoxystrobin[1]	26.350 µg/L	52.864 µg/L
Chlorantraniliprole	4.463 µg/L	8.954 µg/L
Clothianidin	0.156 µg/L	0.313 µg/L
Fludioxonil	43.704 µg/L	87.679 µg/L
Fluoxastrobin	32.266 µg/L	64.731 µg/L
Glyphosate[1]	6399 µg/L or 6.399 mg/L	12838 µg/L or 12.838 mg/L
Imidacloprid	0.031 µg/L	0.063 µg/L
Ipconazole	0.562 µg/L	1.127 µg/L
Mefenoxam	3746 µg/L or 3.746 mg/L	7515 µg/L or 7.515 mg/L
Propiconazole[1]	11.293 µg/L	22.656 µg/L
Prothioconazole[1]	2.850 µg/L	5.718 µg/L
Sedaxane	Report	Report
Tebuconazole	34.339 µg/L	68.890 µg/L
Thiabendazole	83.353 µg/L	167.222 µg/L
Thiamethoxam	2.310 µg/L	4.634 µg/L
Nitrate as Nitrogen	Report	100 mg/L
BOD	30 mg/L	80 mg/L
TSS	46 mg/L	149 mg/L
pH	6.5 – 9.0 S.U.	
Whole Effluent Toxicity – *Ceriodaphnia sp*	Report	1.0 TUa
Whole Effluent Toxicity – *Pimephales Promelas*	Report	1.0 TUa

[1]Calculated using the most stringent acute-based plant benchmark

Outfall 004 Discharge to Johnson Creek downstream of Reservoir 22-A – 1.0 MGD Effluent Flow

AltEn, LLC – Projected Limitations for Johnson Creek – 1.0 MGD		
Parameter	**Monthly Average**	**Daily Maximum**
Spring Ammonia (March 1 – May 31)	2.80 mg/L	5.61 mg/L
Summer Ammonia (June 1 – October 31)	1.47 mg/L	2.95 mg/L
Winter Ammonia (Nov. 1 – February 28 [29])	2.80 mg/L	5.61 mg/L
Abamectin	0.088 µg/L	0.177 µg/L
Azoxystrobin[1]	25.387 µg/L	50.932 µg/L
Chlorantraniliprole	4.300 µg/L	8.627 µg/L
Clothianidin	0.108 µg/L	0.217 µg/L
Fludioxonil	30.332 µg/L	60.851 µg/L
Fluoxastrobin	31.087 µg/L	62.366 µg/L
Glyphosate[1]	6166 µg/L or 6.166 mg/L	12369 µg/L or 12.369 mg/L
Imidacloprid	0.022 µg/L	0.043 µg/L
Ipconazole	0.390 µg/L	0.782 µg/L
Mefenoxam	2600 µg/L or 2.60 mg/L	5216 µg/L or 5.216 mg/L
Propiconazole[1]	10.880 µg/L	21.828 µg/L
Prothioconazole[1]	2.746 µg/L	5.509 µg/L
Sedaxane	Report	Report
Tebuconazole	23.832 µg/L	47.811 µg/L
Thiabendazole	80.307 µg/L	161.111 µg/L
Thiamethoxam	1.603 µg/L	3.216 µg/L
Nitrate as Nitrogen	Report	100 mg/L
BOD	30 mg/L	80 mg/L
TSS	46 mg/L	149 mg/L
pH	6.5 – 9.0 S.U.	
Whole Effluent Toxicity – *Ceriodaphnia sp*	Report	1.0 TUa
Whole Effluent Toxicity – *Pimephales Promelas*	Report	1.0 TUa

[1]Calculated using the most stringent acute-based plant benchmark

Outfall 004 Discharge to Johnson Creek downstream of Reservoir 22-A – 1.5 MGD Effluent Flow

AltEn, LLC – Projected Limitations for Johnson Creek – 1.5 MGD		
Parameter	**Monthly Average**	**Daily Maximum**
Spring Ammonia (March 1 – May 31)	2.40 mg/L	4.82 mg/L
Summer Ammonia (June 1 – October 31)	1.26 mg/L	2.54 mg/L
Winter Ammonia (Nov. 1 – February 28 [29])	2.40 mg/L	4.81 mg/L
Abamectin	0.087 µg/L	0.174 µg/L
Azoxystrobin[1]	25.066 µg/L	50.288 µg/L
Chloranraniliprole	4.246 µg/L	8.518 µg/L
Clothianidin	0.092 µg/L	0.185 µg/L
Fludioxonil	25.874 µg/L	51.908 µg/L
Fluoxastrobin	30.694 µg/L	61.577 µg/L
Glyphosate[1]	6088 µg/L or 6.088 mg/L	12213 µg/L or 12.213 mg/L
Imidacloprid	0.018 µg/L	0.037 µg/L
Ipconazole	0.333 µg/L	0.667 µg/L
Mefenoxam	2218 µg/L or 2.218 mg/L	4449 µg/L or 4.449 mg/L
Propiconazole[1]	10.743 µg/L	21.552 µg/L
Prothioconazole[1]	2.711 µg/L	5.439 µg/L
Sedaxane	Report	Report
Tebuconazole	20.330 µg/L	40.785 µg/L
Thiabendazole	77.622 µg/L	155.725 µg/L
Thiamethoxam	1.368 µg/L	2.744 µg/L
Nitrate as Nitrogen	Report	100 mg/L
BOD	30 mg/L	80 mg/L
TSS	46 mg/L	149 mg/L
pH	6.5 – 9.0 S.U.	
Whole Effluent Toxicity – *Ceriodaphnia sp*	Report	1.0 TUa
Whole Effluent Toxicity – *Pimephales Promelas*	Report	1.0 TUa

[1]Calculated using the most stringent acute-based plant benchmark

Stream Data for Wahoo Creek (LP2-10100)

INTEGRA	SEGMENT_ID	STATION_ID	ACTIVITY_S	MONTH	TEMP	DO	PH	AMMONIA	NO3_NO2	TKN	TOTAL_N_	TP
2020	LP2-10100	SLP2WAHOO107	2015-03-03	3	2.6	12.7	7.7	0.05	2.92	0.5	3.42	0.188
2020	LP2-10100	SLP2WAHOO107	2016-03-08	3	8.4	10.5	8.3	0.05	3.27	1.82	5.09	0.363
2020	LP2-10100	SLP2WAHOO107	2017-03-07	3	8	11	8.1	0.05	3.24	0.853	4.093	0.34
2020	LP2-10100	SLP2WAHOO107	2018-03-05	3	7.8	10.3	7.8	0.318	2.33	2.11	4.44	0.834
2020	LP2-10100	SLP2WAHOO107	2015-04-09	4	9.7	10.3	8.2	0.134	2.13	0.941	3.071	0.317
2020	LP2-10100	SLP2WAHOO107	2016-04-05	4	13.7	10.8	8.3	0.05	2.54	0.562	3.102	0.221
2020	LP2-10100	SLP2WAHOO107	2017-04-06	4	9.3	10.9	8	0.0557	2.68	0.905	3.585	0.31
2020	LP2-10100	SLP2WAHOO107	2018-04-03	4	4.7	12.6	8.1	0.102	3.05	0.942	3.992	0.298
2020	LP2-10100	SLP2WAHOO107	2015-05-04	5	14.5	8.6	7.9	1.6	4.61	12.5	17.11	4.36
2020	LP2-10100	SLP2WAHOO107	2016-05-11	5	15.6	7.8	7.8	0.477	2.37	8.48	10.85	3.44
2020	LP2-10100	SLP2WAHOO107	2015-05-20	5	12.9	9.5	8.2	0.0726	3.5	1.24	4.74	0.561
2020	LP2-10100	SLP2WAHOO107	2015-05-27	5	19.5	8.2	7.8	0.488	3.18	5.96	9.14	1.9
2020	LP2-10100	SLP2WAHOO107	2016-05-03	5	14.5	9.2	8	0.335	3.66	2.21	5.87	0.885
2020	LP2-10100	SLP2WAHOO107	2017-05-02	5	11.6	7.8	7.6	0.819	3.69	4.07	7.76	1.58
2020	LP2-10100	SLP2WAHOO107	2018-05-16	5	18.7	8.9	8.2	0.05	2.69	0.738	3.428	0.299
		Spring	Median		11.600	10.300	8.000	0.102	3.050	1.240	4.440	0.363
			90th Per		17.460	11.960	8.260	0.567	3.678	7.472	10.166	2.824
2020	LP2-10100	SLP2WAHOO107	2015-06-03	6	17.9	8.5	7.9	0.137	3.1	1.34	4.44	0.529
2020	LP2-10100	SLP2WAHOO107	2015-06-08	6	21.4	7.2	7.8	0.158	3.68	5.16	8.82	1.78
2020	LP2-10100	SLP2WAHOO107	2015-06-15	6	20.5	7.8		0.107	3.12	2.18	5.3	0.865
2020	LP2-10100	SLP2WAHOO107	2015-06-22	6	24	7.6	8.2	0.0706	3.42	1.25	4.67	0.529
2020	LP2-10100	SLP2WAHOO107	2015-06-29	6	22.9	8	8	0.0522	3.2	1.1	4.3	0.508
2020	LP2-10100	SLP2WAHOO107	2016-06-08	6	20	8.2	8	0.05	4.65	1.33	5.88	0.527
2020	LP2-10100	SLP2WAHOO107	2017-06-07	6	21.1	8.4	7.9	0.126	3.64	1.16	4.8	0.519
2020	LP2-10100	SLP2WAHOO107	2018-06-12	6	23.8	7.7	8.2	0.05	2.61	1.26	3.87	0.568
2020	LP2-10100	SLP2WAHOO107	2015-07-08	7	23.1	8.3	7.9	0.05	2.87	1.5	4.37	0.62
2020	LP2-10100	SLP2WAHOO107	2015-07-14	7	28.4	8.4	8.1	0.05	3	1.2	4.2	0.471
2020	LP2-10100	SLP2WAHOO107	2015-07-22	7	24.2	8.6	8.4	0.05	3.03	0.882	3.912	0.378
2020	LP2-10100	SLP2WAHOO107	2015-07-28	7	26.8	7.7	8.2	0.05	2.88	0.94	3.82	0.489
2020	LP2-10100	SLP2WAHOO107	2016-07-07	7	23.1	8.2	7.5	0.26	2.3	6	8.3	2.11
2020	LP2-10100	SLP2WAHOO107	2017-07-06	7	23.7	7.7	8	0.0847	4.19	1.3	5.49	0.593
2020	LP2-10100	SLP2WAHOO107	2018-07-03	7	24.6	7.3	7.8	0.05	2.51	2.4	4.91	1.02
2020	LP2-10100	SLP2WAHOO107	2015-08-04	8	21.6	7.6	8.3	0.0919	2.47	1.81	4.28	0.812
2020	LP2-10100	SLP2WAHOO107	2015-08-10	8	24.9	7.1	8	0.0759	2.12	1.92	4.04	0.863
2020	LP2-10100	SLP2WAHOO107	2015-08-17	8	22.2	7.9	8.4	0.0902	2.57	2.14	4.71	1.08
2020	LP2-10100	SLP2WAHOO107	2015-08-25	8	19.1	8.9	8.3	0.0516	2.69	1.15	3.84	0.519
2020	LP2-10100	SLP2WAHOO107	2016-08-04	8	25.5	6.7	7.8	0.0926	2.45	2.45	4.9	0.92
2020	LP2-10100	SLP2WAHOO107	2017-08-01	8	23.2	8.3		0.05	3.4	1.06	4.46	0.485
2020	LP2-10100	SLP2WAHOO107	2018-08-08	8	24.6	8.6	9.4	0.05	2.78	1.21	3.99	0.491
2020	LP2-10100	SLP2WAHOO107	2015-09-01	9	21.2	8.3	8	0.05	2.46	1.07	3.53	0.521
2020	LP2-10100	SLP2WAHOO107	2015-09-10	9	20.6	9	8.3	0.05	2.62	0.59	3.21	0.36
2020	LP2-10100	SLP2WAHOO107	2015-09-16	9	20.9	8.3	8.7	0.05	3.25	0.5	3.75	0.315
2020	LP2-10100	SLP2WAHOO107	2015-09-23	9	19.4	8.5	8.2	0.0723	2.87	0.733	3.603	0.417
2020	LP2-10100	SLP2WAHOO107	2015-09-30	9	13.2	9.8	8	0.0665	2.14	0.852	2.992	0.416
2020	LP2-10100	SLP2WAHOO107	2016-09-05	9	21.1	8.6	8	0.11	2.96	1.09	4.05	0.425
2020	LP2-10100	SLP2WAHOO107	2017-09-06	9	16.1	9.5	8.4	0.0536	3.09	0.757	3.847	0.391
2020	LP2-10100	SLP2WAHOO107	2018-09-06	9	21.7	8.1	7.9	0.197	0.546	3.62	4.166	1.48
2020	LP2-10100	SLP2WAHOO107	2015-10-05	10	11.3	10.3	8.3	0.05	2.92	0.5	3.42	0.3
2020	LP2-10100	SLP2WAHOO107	2016-10-11	10	16	9.1	8.5	0.1	3.36	0.918	4.278	0.426
2020	LP2-10100	SLP2WAHOO107	2017-10-02	10	18.2	7.2	7.8	0.0948	1.99	3.88	5.87	1.74
2020	LP2-10100	SLP2WAHOO107	2018-10-01	10	12.5	9.8		0.0505	2.81	1.05	3.86	0.45
		Summer	Median		21.500	8.300	8.000	0.060	2.875	1.205	4.239	0.520
			90th Per		24.810	9.380	8.400	0.134	3.574	3.269	5.756	1.360
2020	LP2-10100	SLP2WAHOO107	2015-01-05	1	0.1	14	7.3	0.0915	3.37	0.5	3.87	0.211
2020	LP2-10100	SLP2WAHOO107	2016-01-13	1	0	13.7	8.1	0.134	3.59	0.535	4.125	0.255
2020	LP2-10100	SLP2WAHOO107	2017-01-19	1	2.4	12	8.2	0.68	3.38	3.22	6.58	1.65
2020	LP2-10100	SLP2WAHOO107	2018-01-09	1	0	12.9	7.9	0.0706	3.54	0.53	4.07	0.214
2020	LP2-10100	SLP2WAHOO107	2015-02-05	2	0	14.2	7.4	0.074	2.92	0.5	3.42	0.173
2020	LP2-10100	SLP2WAHOO107	2016-02-08	2	2	12.9	8.3	0.143	3.26	0.918	4.178	0.427
2020	LP2-10100	SLP2WAHOO107	2017-02-14	2	4.2	12.1	8.2	0.126	3.66	0.928	4.588	0.45
2020	LP2-10100	SLP2WAHOO107	2018-02-14	2	0	13.5	7.9	0.05	3.51	0.58	4.09	0.219
2020	LP2-10100	SLP2WAHOO107	2015-11-02	11	11	10.2	8	0.0684	2.63	0.5	3.13	0.246
2020	LP2-10100	SLP2WAHOO107	2016-11-16	11	8.5	11.2	8.1	0.05	3.19	0.56	3.75	0.238
2020	LP2-10100	SLP2WAHOO107	2017-11-13	11	5.5	12.3	8.2	0.05	3.19	0.544	3.734	0.238
2020	LP2-10100	SLP2WAHOO107	2018-11-06	11	7.1	11.3	8.3	0.05	2.82	0.654	3.474	0.282
2020	LP2-10100	SLP2WAHOO107	2015-12-09	12	5	11.9	8.3	0.076	2.99	0.5	3.49	0.196
2020	LP2-10100	SLP2WAHOO107	2016-12-15	12	-0.1	13.5	8.5	0.113	3.9	0.532	4.432	0.212
2020	LP2-10100	SLP2WAHOO107	2017-12-12	12	1.8	13.4	8.2	0.0608	3.07	1.01	4.08	0.354
2020	LP2-10100	SLP2WAHOO107	2018-12-03	12	0.6	12.6	8.3	0.59	2.73	3.09	5.82	1.23
		Winter	Median		1.900	12.750	8.200	0.075	3.225	0.552	4.075	0.242
			90th Per		7.500	13.850	8.300	0.367	3.625	2.650	5.204	0.840

Stream Data for Johnson Creek (LP2-10121)

Segment	Station #	DATE	Month	Temp	DO	pH	Ammonia	NO3-NO2	TKN	Total N Assessed	TP		Q
LP2-10121	SLP2JOHNC110	2016-05-02	5	16.5	9.4	8.0	0.419	3.61	2.01	5.62	0.59		2.2
LP2-10121	SLP2JOHNC110	2016-05-09	5	19.4	8.4	7.9	0.343	3.91	2.18	6.09	0.58		1.4
LP2-10121	SLP2JOHNC110	2016-05-16	5	13.7	9.2	8.1	0.278	2.08	3.08	5.16	1.17		1
LP2-10121	SLP2JOHNC110	2016-05-23	5	18.6	7.6	8.2	0.148	3.17	1.77	4.94	0.70		1
LP2-10121	SLP2JOHNC110	2016-05-31	5	20.9	5.9	7.4	0.176	4.93	1.12	6.05	0.47		1
LP2-10121	SLP2JOHNC110	2016-06-06	6	24.8	7.7	8.1	0.139	4.91	1.61	6.52	0.54		1
LP2-10121	SLP2JOHNC110	2016-06-13	6	24.8	6.0	7.8	0.159	5.30	0.85	6.15	0.30		1
LP2-10121	SLP2JOHNC110	2016-06-20	6	25.4	7.3	7.8	0.109	3.94	2.02	5.96	0.51		1.4
LP2-10121	SLP2JOHNC110	2016-06-27	6	22.7	4.4	7.1	0.076	3.72	1.39	5.11	0.47		1
LP2-10121	SLP2JOHNC110	2016-07-05	7	25.1	7.2	7.4	0.122	3.44	1.49	4.93	0.48		2
LP2-10121	SLP2JOHNC110	2016-07-11	7	25.4	7.8		0.050	3.79	0.93	4.72	0.28		1
LP2-10121	SLP2JOHNC110	2016-07-18	7	22.5	7.9	7.7	0.054	3.65	1.18	4.83	0.31		1
LP2-10121	SLP2JOHNC110	2016-07-25	7	28.0	6.9	7.7	0.050	4.60	0.88	5.48	0.24		1
LP2-10121	SLP2JOHNC110	2016-08-01	8	21.7	5.4	7.6	0.084	4.58	0.73	5.31	0.24		1
LP2-10121	SLP2JOHNC110	2016-08-08	8	20.7	8.8	7.6	0.201	6.99	0.88	7.87	0.34		1
LP2-10121	SLP2JOHNC110	2016-08-15	8	17.9	5.4	7.0	0.109	4.81	0.86	5.67	0.25		1
LP2-10121	SLP2JOHNC110	2016-08-22	8	23.0	7.0	7.3	0.240	3.65	1.02	4.67	0.22		1
LP2-10121	SLP2JOHNC110	2016-08-29	8	19.5	5.5	7.6	0.260	4.42	1.10	5.52	0.31		1
LP2-10121	SLP2JOHNC110	2016-09-06	9	19.4	4.9	7.0	0.150	6.05	0.81	6.86	0.23		2.2
LP2-10121	SLP2JOHNC110	2016-09-12	9	18.3	5.7	7.8	0.200	6.95	0.94	7.89	0.26		1
LP2-10121	SLP2JOHNC110	2016-09-19	9	21.7	6.8	7.1	0.110	3.07	1.48	4.55	0.52		1.7
LP2-10121	SLP2JOHNC110	2016-09-26	9	19.9	8.3	7.3	0.240	4.57	0.98	5.55	0.30		1
		Median		21.300	7.100	7.600	0.149	4.180	1.110	5.535	0.322	Mean	1.22
		Crit 90%		25.370	8.760	8.100	0.276	5.975	2.019	6.830	0.585		

EPA Ecological and Human Health Benchmarks

			Ecological Benchmarks[1]								Human Health Benchmarks[2]		
			Fish		Invertebrates		Plants		Office of Water Aquatic Life Criteria				
Active ingredient	CAS Number	Limit of Quantitation (LOQ) (µg/L)	Fish Acute (µg/L)	Fish Chronic (µg/L)	Invertebrate Acute (µg/L)	Invertebrate Chronic (µg/L)	Non-Vascular Plants Acute (µg/L)	Vascular Plants Acute (µg/L)	Maximum Concentration (CMC)	Continuous Concentration (CCC)	Acute or One Day HHBPs (µg/L)	Chronic or Lifetime HHBPs (µg/L)	Carcinogenic HHBP (E-6 to E-4) (µg/L)
Abamectin	71751-41-2	0.060	1.6	0.52	0.17	N/A	> 100000	3900	N/A	N/A	17	15	N/A
Acetamiprid	135410-20-7	0.060	> 50000	19200	10.5	2.1	> 1000	> 1000	N/A	N/A	700	420	N/A
AMPA	1066-51-9	40	249500	N/A	341500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Azoxystrobin	131860-33-8	0.080	235	147	130	44	49	3400	N/A	N/A	4800	1070	N/A
Bifenthrin	82657-04-3	0.080	0.075	0.004	0.0002495	0.00005	> 250	> 330	N/A	N/A	310	N/A	N/A
Brassinazole	224047-41-0	0.060	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Captan	133-06-2	0.30	13.1	16.5	4200	560	320	> 12700	N/A	N/A	2050	770	N/A
Carbendazim	10605-21-7	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	630	830	12.4-1240
Carboxin	5234-68-4	0.080	600	N/A	42300	N/A	378	870	N/A	N/A	N/A	N/A	N/A
Chlorantraniliprole	500008-45-7	0.060	> 6900	110	8.3	2.02	> 1750	> 2000	N/A	N/A	N/A	9350	N/A
Chlorpyrifos	2921-88-2	0.080	0.9	0.57	0.05	0.04	140	N/A	0.083	0.041	N/A	N/A	N/A
Chlorpyrifos-methyl	5598-13-0	0.080	7	N/A	0.085	N/A	N/A	N/A	N/A	N/A	2.2	1.9	N/A
Clothianidin	210880-92-5	0.080	> 50750	9700	11	0.05	64000	> 280000	N/A	N/A	1700	580	N/A
Cyantraniliprole	736994-63-1	0.060	> 5000	10700	10.2	6.56	> 10000	> 12100	N/A	N/A	N/A	60	N/A
Cyfluthrin	68359-37-5	0.30	0.034	0.0042	0.0125	0.00012	> 2	N/A	N/A	N/A	76	N/A	N/A
Cypermethrin	52315-07-08	0.30	0.195	0.051	0.00029	< 0.00006	25000	> 1.62	N/A	N/A	477	N/A	N/A
Cyproconazole	94361-06-5	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	600	60	N/A
Deltamethrin	52918-63-5	0.30	0.575	0.017	0.0051	0.000026	> 9.1	> 779	N/A	N/A	100	N/A	N/A
Difenoconazole	119446-68-3	0.060	405	0.86	385	5.6	98	1900	N/A	N/A	1700	60	N/A
Dimoxystrobin	149961-52-4	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dinotefuran	165252-70-0	0.080	> 49550	6360	> 484150	> 95300	> 97600	> 110000	N/A	N/A	3330	6000	N/A
Epoxiconazole	133855-98-8	0.060	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,000	100	0.873-87.3
Fluconazole	-	0.060	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fludioxonil	131341-86-1	0.080	225	18	450	14	280	630	N/A	N/A	N/A	2000	N/A
Fluoxastrobin	361377-29-9	0.080	217.5	58.7	80	48	268	1200	N/A	N/A	N/A	88	N/A
Glufosinate	77182-82-2	10	> 156000	50000	325500	31000	72	1470	N/A	N/A	1800	40	N/A
Glyphosate	1071-83-6	10	21500	25700	26600	49900	12100	11900	N/A	N/A	N/A	700	N/A
Imidacloprid	138261-41-3	0.080	114500	9000	0.385	0.01	N/A	N/A	N/A	N/A	500	500	N/A
Ipconazole	125225-28-7	0.080	765	0.18	890	30.4	650	360	N/A	N/A	3000	89	N/A
Isavuconazole	-	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Itraconazole	-	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
lambda-Cyhalothrin	91465-08-6	0.080	0.0145	0.031	0.00004	0.00002	> 310	> 0.508	N/A	N/A	8.2	N/A	N/A
Mefenoxam	70630-17-0	0.080	> 59000	9100	28900	1200	N/A	77000	N/A	N/A	3000	N/A	N/A
Metconazole	125116-23-6	0.080	1650	2.9	2850	31	81	20	N/A	N/A	8000	200	N/A
Nitenpyram	-	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orysastrobin	-	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Permethrin	52645-53-1	0.10	0.395	0.050	0.0039	0.0042	> 4.4	> 3.2	N/A	N/A	2900	N/A	N/A
Picoxystrobin	117428-22-5	0.080	32.5	36	12	1	4	210	N/A	N/A	1000	270	N/A
Posaconazole	-	0.10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Propiconazole	60207-90-1	0.080	425	18	2400	180	21	3500	N/A	N/A	2300	600	N/A
Prothioconazole	178928-70-6	0.10	884.5	163	800	113	5.0	36	N/A	N/A	600	60	N/A
Pyraclostrobin	175013-18-0	0.080	3.1	2.35	7.85	4	1.5	1107	N/A	N/A	1000	200	N/A
Ravuconazole	-	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sedaxane	874967-67-6	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2000	650	N/A
Tebuconazole	107534-96-3	0.080	1135	11	1440	120	1480	151	N/A	N/A	190	170	N/A
Tetraconazole	112281-77-3	0.080	1625	80	1315	190	2280	310	N/A	N/A	3000	43	N/A
Thiabendazole	148-79-8	0.080	280	110	155	42	1480	2320	N/A	N/A	3000	600	N/A
Thiacloprid	111988-49-9	0.060	12600	918	18.9	0.97	45000	> 95400	N/A	N/A	70	28	0.729-72.9
Thiamethoxam	153719-23-4	0.060	> 57000	20000	17.5	0.74	> 90000	> 90000	N/A	N/A	2000	71	N/A
Thiophanate methyl	23564-05-8	0.080	5500	N/A	2700	N/A	930	> 4700	N/A	N/A	3000	960	2.55-255
Tioxazafen	330459-31-9	0.080	48.5	8.4	> 800	5.9	125	> 854	N/A	N/A	1700	300	N/A
Trifloxystrobin	141517-21-7	0.060	7.15	4.3	12.65	2.76	37.1	> 1930	N/A	N/A	71000	220	N/A
Uniconazole	83657-17-4	0.060	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1000	100	N/A
Voriconazole	-	0.080	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1]All ecological data is from https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-and-ecological-risk. This data was updated by EPA on August 31, 2021

[2]All human health data is from https://iaspub.epa.gov/apex/pesticides/f?p=HHBP:home:1823965192414::: This data was updated by EPA on August 31, 2021

ED_013286A_00000661-00016

Chronic Ammonia Criteria Calculation

Warmwater Aquatic Life Use Class Specific Criteria.
Total Ammonia (as nitrogen).
Median In-stream pH and Temperature

Spring			Summer			Winter		
Chronic Criteria	Median pH	Median Temp	Chronic Criteria	Median pH	Median Temp	Chronic Criteria	Median pH	Median Temp
1.336	**8.000**	**11.600**	**0.705**	**8.000**	**21.500**	**1.324**	**8.200**	**1.900**

003.04A2 Thirty-day average concentration in mg/l not to exceed the numerical value given by

$$CV = 0.8876\left(\frac{0.0278}{1+10^{7.688-pH}}+\frac{1.1994}{1+10^{pH-7.688}}\right)\left(2.126\times 10^{0.028\times(20-\text{Maximum of (Temp. or 7)})}\right)$$

where Temp is °C

003.04A2a The highest four-day average concentration within a thirty-day period shall not exceed 2.5 times the thirty-day criterion.

003.04A2b The following table shows thirty-day average criteria for total ammonia at various temperatures and pHs.

THIRTY-DAY AVERAGE CRITERIA FOR TOTAL AMMONIA (mg/l)
Warmwater Aquatic Life Use Classes

Temperature (°C)	pH 6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.0
0.0	4.85	4.65	4.36	3.98	3.49	2.94	2.35	1.80	1.32	0.95	0.68	0.49	0.36
2.0	4.85	4.65	4.36	3.98	3.49	2.94	2.35	1.80	1.32	0.95	0.68	0.49	0.36
4.0	4.85	4.65	4.36	3.98	3.49	2.94	2.35	1.80	1.32	0.95	0.68	0.49	0.36
6.0	4.85	4.65	4.36	3.98	3.49	2.94	2.35	1.80	1.32	0.95	0.68	0.49	0.36
8.0	4.54	4.36	4.09	3.73	3.28	2.75	2.20	1.68	1.24	0.89	0.64	0.46	0.34
10.0	3.99	3.83	3.60	3.28	2.88	2.42	1.94	1.48	1.09	0.78	0.56	0.40	0.30
12.0	3.51	3.37	3.16	2.88	2.53	2.13	1.70	1.30	0.96	0.69	0.49	0.35	0.26
14.0	3.09	2.96	2.78	2.53	2.23	1.87	1.50	1.14	0.84	0.61	0.43	0.31	0.23
16.0	2.71	2.60	2.44	2.23	1.96	1.64	1.32	1.01	0.74	0.53	0.38	0.27	0.20
18.0	2.38	2.29	2.15	1.96	1.72	1.44	1.16	0.88	0.65	0.47	0.33	0.24	0.18
20.0	2.10	2.01	1.89	1.72	1.51	1.27	1.02	0.78	0.57	0.41	0.29	0.21	0.16
22.0	1.84	1.77	1.66	1.51	1.33	1.12	0.89	0.68	0.50	0.36	0.26	0.19	0.14
24.0	1.62	1.55	1.46	1.33	1.17	0.98	0.79	0.60	0.44	0.32	0.23	0.16	0.12
26.0	1.42	1.37	1.28	1.17	1.03	0.86	0.69	0.53	0.39	0.28	0.20	0.14	0.11
28.0	1.25	1.20	1.13	1.03	0.90	0.76	0.61	0.46	0.34	0.25	0.18	0.13	0.09
30.0	1.10	1.05	0.99	0.90	0.79	0.67	0.53	0.41	0.30	0.22	0.15	0.11	0.08

Acute Ammonia Criteria Calculation

Warmwater Aquatic Life Use Class Specific Criteria.

Total Ammonia (as nitrogen).

90th Percentile Effluent pH and Temperature

Spring			Summer			Winter		
Acute Criteria	P_{90} pH	P_{90} Temp	Acute Criteria	P_{90} pH	P_{90} Temp	Acute Criteria	P_{90} pH	P_{90} Temp
11.401	**7.500**	**17.460**	**6.199**	**7.500**	**24.810**	**20.746**	**7.500**	**7.800**

003.04A1 One-hour average concentration in mg/l not to exceed the numerical value given by

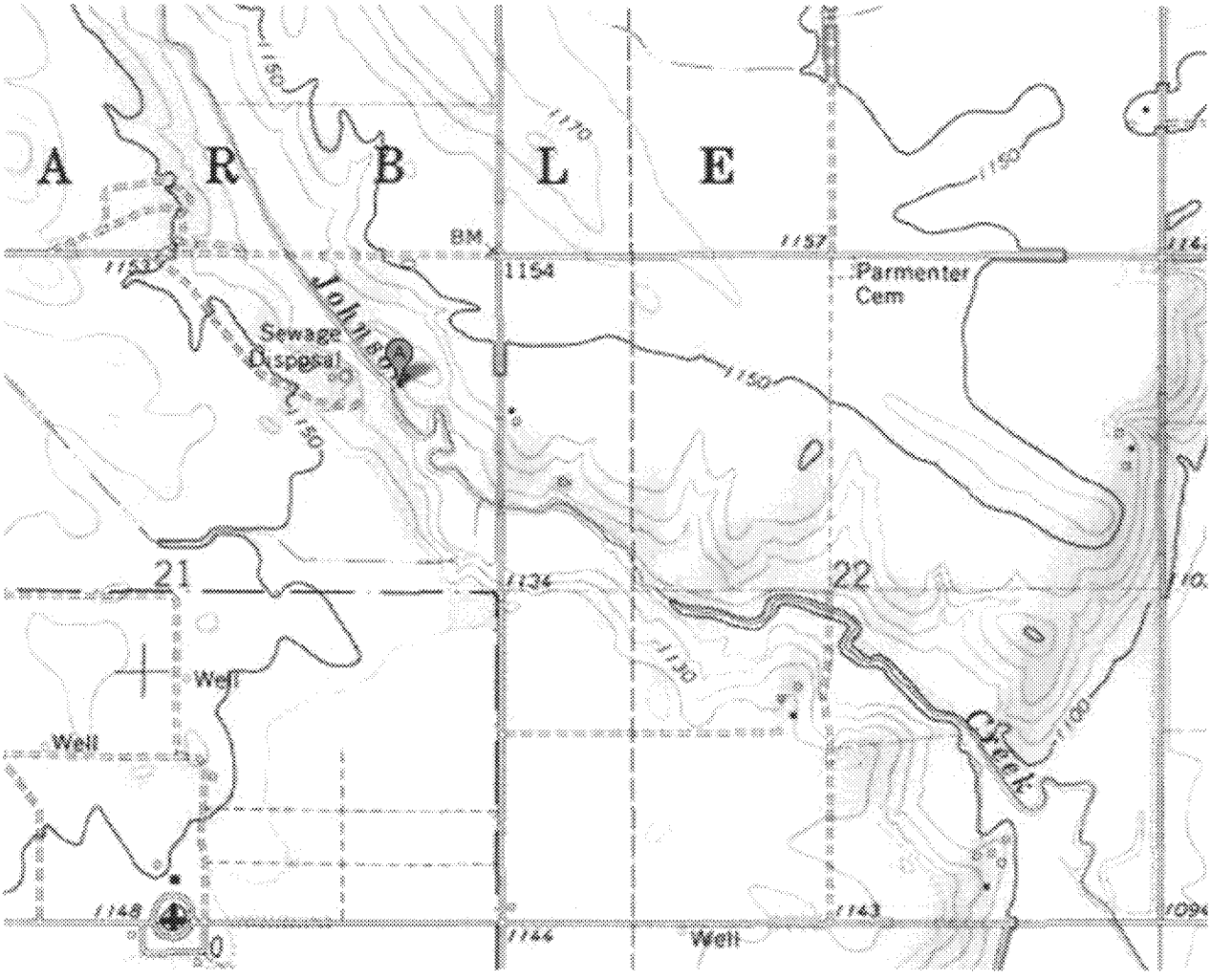
$$AV = 0.7249\left(\frac{0.0114}{1+10^{7.204-pH}} + \frac{1.6181}{1+10^{pH-7.204}}\right) \times \text{Minimum of}\left\{51.93, \text{ or } 23.12\left(10^{0.036(20-Temp^{\circ})}\right)\right\}$$

where Temp is °C

ONE-HOUR AVERAGE CRITERIA FOR TOTAL AMMONIA (mg/l)
Warmwater Aquatic Life Use Classes

Temperature (°C) \ pH	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.0
0.0	48.86	43.80	37.65	30.81	23.96	17.77	12.66	8.77	5.97	4.05	2.77	1.92	1.38
2.0	48.86	43.80	37.65	30.81	23.96	17.77	12.66	8.77	5.97	4.05	2.77	1.92	1.38
4.0	48.86	43.80	37.65	30.81	23.96	17.77	12.66	8.77	5.97	4.05	2.77	1.92	1.38
6.0	48.86	43.80	37.65	30.81	23.96	17.77	12.66	8.77	5.97	4.05	2.77	1.92	1.38
8.0	48.86	43.80	37.65	30.81	23.96	17.77	12.66	8.77	5.97	4.05	2.77	1.92	1.38
10.0	48.86	43.80	37.65	30.81	23.96	17.77	12.66	8.77	5.97	4.05	2.77	1.92	1.38
12.0	42.32	37.85	32.53	26.62	20.70	15.35	10.94	7.58	5.16	3.50	2.39	1.66	1.19
14.0	35.77	32.07	27.56	22.56	17.54	13.01	9.27	6.42	4.37	2.97	2.02	1.41	1.01
16.0	30.30	27.17	23.35	19.11	14.86	11.02	7.85	5.44	3.71	2.51	1.72	1.19	0.86
18.0	25.67	23.02	19.78	16.19	12.59	9.34	6.65	4.61	3.14	2.13	1.45	1.01	0.73
20.0	21.75	19.50	16.76	13.72	10.67	7.91	5.64	3.90	2.66	1.80	1.23	0.86	0.62
22.0	18.43	16.52	14.20	11.62	9.04	6.70	4.78	3.31	2.25	1.53	1.04	0.73	0.52
24.0	15.61	14.00	12.03	9.85	7.66	5.68	4.05	2.80	1.91	1.29	0.88	0.62	0.44
26.0	13.23	11.86	10.19	8.34	6.49	4.81	3.43	2.37	1.62	1.10	0.75	0.52	0.37
28.0	11.21	10.05	8.64	7.07	5.50	4.08	2.90	2.01	1.37	0.93	0.63	0.44	0.32
30.0	9.50	8.51	7.32	5.99	4.66	3.45	2.46	1.70	1.16	0.79	0.54	0.37	0.27

Discharge Point on Johnson Creek Maps – Topographic Map
A – Approximate location of proposed Outfall 004



Discharge Point on Johnson Creek Maps – Aerial Photograph
A – Approximate location of proposed Outfall 004

Johnson Creek Rating Curve – Flow was measured at 0.66 cfs

Station Number	Station Name	HUC Code	Survey Date
SLP2JOHNC110	Johnson Creek northeast of Memphis	102002031002	10/3/16
Stream Number	**Latitude**	**Longitude**	
LP2-10121	41.146812	-96.387224	

Tape Reading (ft)	(cfs)	Elev (ft)	
15.18	0.04	87.64	
15.08	0.20	87.70	
14.98	0.48	87.80	
14.93	0.66	87.83	* Ref Ht
14.88	0.83	87.90	
14.78	1.23	88.00	
14.68	1.77	88.10	
14.58	2.33	88.20	
14.48	2.94	88.30	
14.38	3.60	88.40	
14.28	4.32	88.50	
14.18	5.04	88.60	
14.08	5.82	88.70	
13.98	6.57	88.80	
13.88	7.37	88.90	
13.78	8.24	89.00	
13.68	9.16	89.10	
13.58	10.14	89.20	
13.48	11.08	89.30	
13.38	12.16	89.40	
13.28	13.24	89.50	
13.18	14.48	89.60	
13.08	15.80	89.70	
12.98	17.31	89.80	
12.88	18.82	89.90	
12.78	20.52	90.00	
12.68	22.33	90.10	
12.58	24.23	90.20	
12.48	25.90	90.30	
12.38	27.68	90.40	
12.28	29.58	90.50	
12.18	31.76	90.60	
12.08	34.49	90.70	
11.98	37.52	90.80	
11.88	39.21	90.90	
11.78	41.27	91.00	
11.68	45.07	91.10	
11.58	49.03	91.20	

Johnson Creek – Velocity in stream – used 0.58 ft/sec in wasteload allocation

4/0

Stream Channel Survey - Discharge Form

Stream: Johnson Creek LP2-10121 Measured by: Mick ______

Site #: LP2 10121 Date: 10-3-10 ______

Latitude: ______ Longitude: ______

Stream Width (ft): 2.0 Reference/Gage Ht:

Calculated Discharge (ft³/sec): 0.06

Distance from Bank (ft)	Depth at Obs Point (ft)	Velocity of Obs Point (ft/sec)	Distance from Bank (ft)	Depth at Obs Point (ft)	Velocity of Obs Point (ft/sec)
0.5	0.35	0.02			
1.0	0.20	0.60			
2.0	0.30	0.58			
3.0	.2	0.58			
4.0	0.2	.45			
5.0	0.15	0.55			
5.5	0.02	0.02			

Johnson Creek – Width – used 6 feet in wasteload allocation

40

CHANNEL SURVEY FIELD SHEET

STREAM NAME: Johnson Creek EPA-[illegible] DATE: 10-3-06

SURVEY LOCATION DESCRIPTION: ____________

LATITUDE: ____________ LONGITUDE: ____________

GAGE INSTALLED: YES / NO (circled) GAGE HT [illegible]

PHOTOS: UP 33 DOWN 34 DISCHARGE CFS) ____________

[illegible]

CHANNEL SLOPE DATA

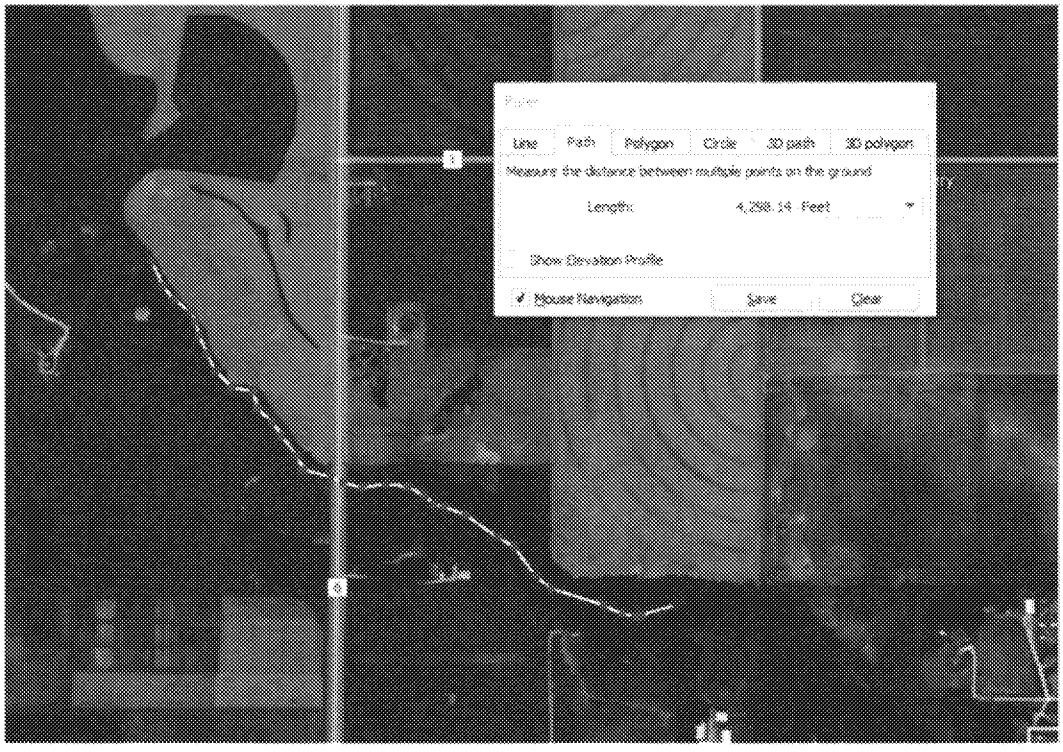
ELEVATION (FT) - UP ______ DOWN ______

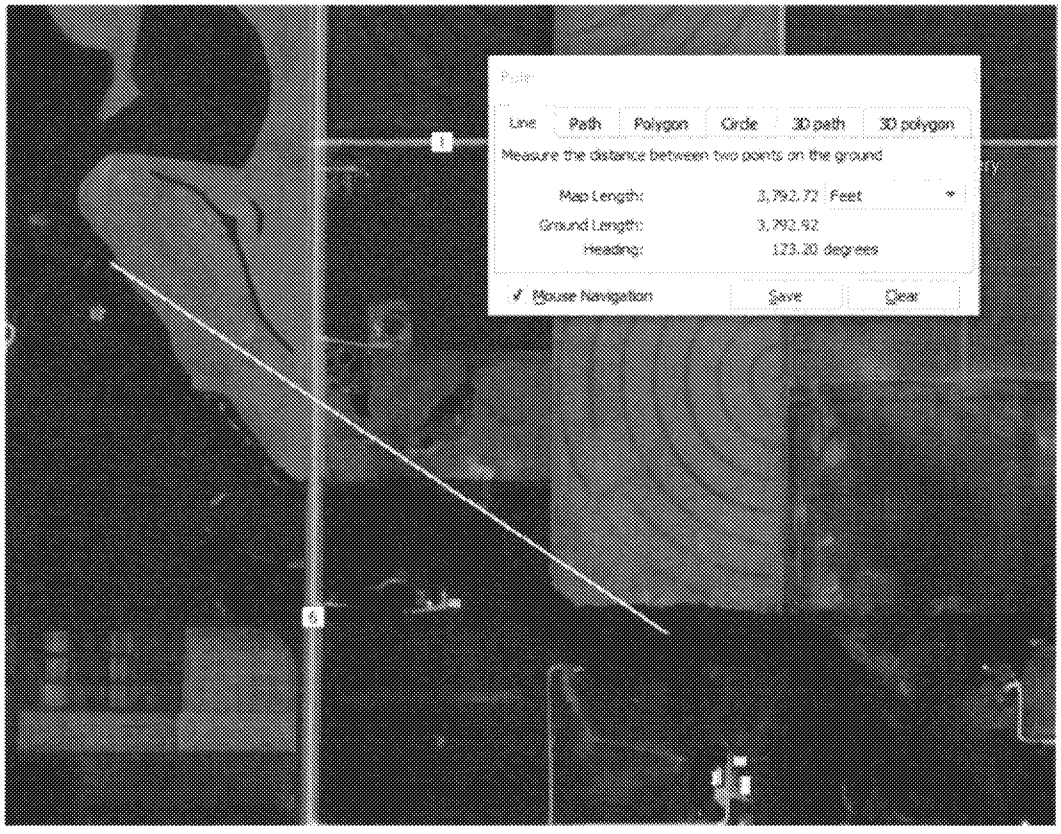
DISTANCE (FT) : UP ______ DOWN ______ TOTAL ______

10/26,092 = 0.000383259

DISTANCE (FT)	ELEVATION (FT)	DISTANCE (FT)	ELEVATION (FT)	DISTANCE (FT)	ELEVATION (FT)
0.0	9.04				
2.8	9.10				
3.9	10.00				
[illegible]	10.24				
4.0	[illegible]				
[illegible]	12.17				
9.5	12.30				
11.2	12.46				
13.5	12.38				
14.5	12.26				
[illegible]	12.17				
15.0	11.34				
16.4	10.74				
[illegible]	9.80				
[illegible]	9.50				
21.0	6.14				

Sinuosity Calculation – Ls/Lv
4298 / 3793 = 1.13





Thiesfeld, Joseph

From: Stoll, Hillary
Sent: Thursday, December 23, 2021 7:15 AM
To: Thiesfeld, Joseph
Cc: Ducey, Patrick
Subject: Fw: AltEn Proposed Outfall Discharge Limits
Attachments: AltEn_ProposedLimits_2021_1222.pdf

Hi Joe,

Please send email and the attached document to AltEn's file.

Since this is for a proposed permit and not their existing PCS permit, there is no PCS number yet. If this is an issue for filing purposes, please talk to Patrick as I will be out of the office today and unable to respond to emails until later today. Thank you and happy holidays!!

Thanks,

Hillary Stoll | *Engineer*
Engineering Section
PERMITTING & ENGINEERING DIVISION
Nebraska Department of Environment & Energy
DIRECT: 402-471-4252 | MAIN OFFICE: 402-471-2186
PO Box 98922, Lincoln, NE 68509

From: Stoll, Hillary
Sent: Thursday, December 23, 2021 7:12 AM
To: Don Gunster <dgunster@newfields.com>
Cc: Ducey, Patrick <patrick.ducey@nebraska.gov>; Borovich, Jim <jim.borovich@nebraska.gov>; Buell, Thomas <thomas.buell@nebraska.gov>; Goans, Steve <steve.goans@nebraska.gov>
Subject: AltEn Proposed Outfall Discharge Limits

Don,

Please see attached memorandum with proposed discharge limits for the two proposed discharge locations requested by AFRG.

Best,

Hillary Stoll | *Engineer*
Engineering Section
PERMITTING & ENGINEERING DIVISION
Nebraska Department of Environment & Energy
DIRECT: 402-471-4252 | MAIN OFFICE: 402-471-2186
PO Box 98922, Lincoln, NE 68509